

Additional Data on the Shooting of President Kennedy

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THE JOURNAL has performed a great service in persuading Humes, Boswell, and Finck to answer extended queries about the details of the autopsy of President Kennedy.^{1,2} They replied directly to many of the questions raised by the critics of the Warren Commission report, an excellent move toward "full disclosure." However, we must remember that Humes, Boswell, and Finck wrote their autopsy report without seeing the

See also pp 1507, 1540, and 1552.

color photographs or studying in detail the roentgenograms of the body that were taken at the autopsy. The photographs had been confiscated by the Attorney General (the President's brother) without being developed, and they were then turned over to the National Archives (from which they have never been released). The basis for this confiscation was the family's desire that the photographs of the President's exploded head not appear in every bookstore window, as they would have had they become part of the public record. Having examined these full-color photographs, I can say that they are far more shocking than the contrived latex dummies and allegedly genuine illustrations that are now appearing in certain

"entertainment" features. The roentgenograms were taken to determine if any bullets remained in the body. The autopsy surgeons had only a brief time to look at them and little chance to make precise measurements on the films (for example, to pinpoint the wound of entry on the skull).

After reviewing the restricted autopsy materials of President Kennedy several times, I was impressed by the superior quality of the roentgenograms taken by US Navy radiologist John H. Ebersole, MD, despite the demands for haste that were forced on the prosecutors. The photographs by chief navy photographer John T. Stringer also are of the highest quality. No one else was allowed to take photographs; when an unauthorized navy technician attempted to take some photographs at the autopsy, his film was seized and destroyed on the spot.

The large number of letters to the editor³ commenting on the articles in THE JOURNAL demonstrates physicians' concern about the issues the contrarian community and the entertainment industry have pressed on us and about other forensic questions such as, "Did a single bullet wound both men?" and "Why did President Kennedy's head move back toward the gun after it was struck?" I present information about each of these points.

A SINGLE BULLET

The instant at which both Kennedy and Connally were hit by the single bullet (Warren Commission exhibit 399) has been identified as frame 224 of the Zapruder film by experts of Failure Analysis Associates Inc, Menlo Park, Calif,

working with Martin Fackler, MD.⁴ They pointed out that, in this frame, the right lapel of Governor Connally's jacket suddenly bulged far forward, pushed outward by the tumbling bullet and the accompanying hail of soft-tissue particles that exited his chest below the right nipple (Fig 1). The bullet went on through his right wrist and, traveling backward, buried itself in his left thigh. Previous studies by other analysts, such as Itek Corporation, New York, NY, had postulated that this happened in either frame 223 or frame 224, on the basis of the movements of Governor Connally's body. To my knowledge, the lapel bulge had not been specifically pointed out before the Failure Analysis study. Previously, we had observed that the clothing on our research models often "flapped" forward when the body was hit.^{5(p223)}

SIMULTANEOUS ARM MOVEMENTS

The right arms of both President Kennedy and Governor Connally started their upward jerks in frame 225 (Fig 2), immediately after the bullet went through both men. President Kennedy's right arm started its upward movement toward his face (Thorburn's reflex position⁶) as his deltoid muscle contracted in response to the bullet wound through his right brachial plexus, stimulating his axillary nerve. Governor Connally's right hand, in which he was holding his white Stetson hat, was pressed against his left thigh to help push himself around to try to see President Kennedy, as Connally later testified.⁷ The white dot of his hand holding the hat appeared in frame 225 and came progressively farther up into sight in each succeeding frame until

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Fig 1.—In frame 224 (center) of the Zapruder film, bullet 399 strikes Governor Connally in the back. It exits under his right nipple with a cloud of bloody rib fragments. This bulges the right lapel of Connally's coat forward in frame 224. Then, the lapel snaps back into position. When the movie is run very slowly, this becomes obvious. It had not been noted until recently, when Failure Analysis Associates Inc pointed it out. (Copyright © 1967 LMH Company c/o James Lorin Silverberg, Esq. All rights reserved.)

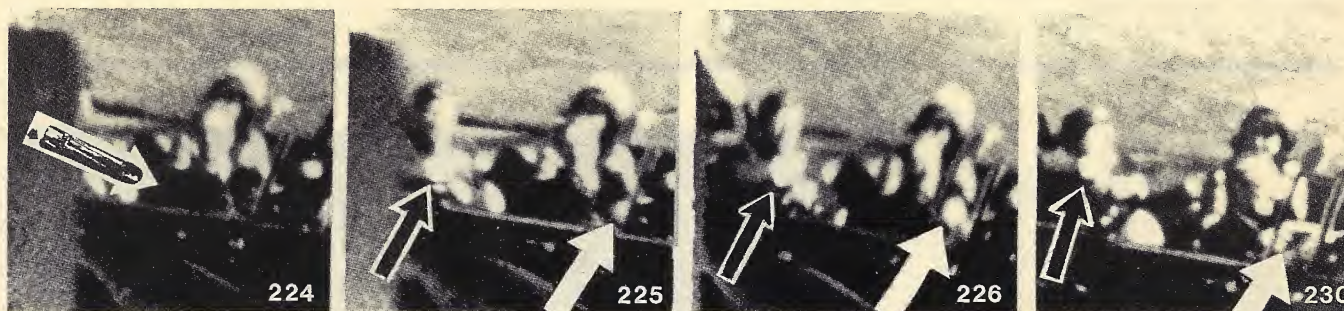


Fig 2.—The right arms of both men snap upward, starting at the same moment (frame 225) immediately after bullet 399 goes through both President Kennedy and Governor Connally. President Kennedy's right arm moves up into Thorburn's reflex position due to the shock to C6-7 and to his brachial plexus. Governor Connally's right hand, holding his white Stetson hat (white arrows), jerks up as his biceps contract in response to the same bullet striking the periosteum of his wrist. The hat flips up in front of him. (Copyright © 1967 LMH Company c/o James Lorin Silverberg, Esq. All rights reserved.)

frame 230, where the hat, then flipping upward, was clearly visible. This flipping motion was due to the cortical reflex contraction of his biceps in response to the painful stimulus of the perforating wound to the periosteum near the lower end of his right radius. Meanwhile, Kennedy's right hand came higher with each succeeding frame. His left hand also started coming up, at a slightly slower rate, as the shock wave from the bullet spread across the midline and stimulated the nerves of the brachial plexus on the left side, but with lower intensity than on the right side. The next more distant muscular groups affected were President Kennedy's biceps as the impulse traveled down the musculocutaneous nerve. The flexor muscles of the wrists and hands contracted as the impulse traveled still further along the median and ulnar nerves. Finally, by frame 236, President Kennedy has assumed the reflex position illustrated by Thorburn⁶ almost 100 years ago (Fig 3). This sequence of reactions has been described by Kenneth J. Strully, MD (written communication, July 1992). Michael West, DDS (forensic), and Johann Rush pointed out the simultaneous arm movements of both men in response to injury by the single bullet, and they have also de-

scribed a newborn child in the Thorburn position after a lower cervical neck fracture (written communication, December 1992).

Strully also pointed out that the bullet that hit President Kennedy in the neck traumatized both vagus nerve and the phrenic nerves (bilaterally) resulting in respiratory paralysis, cardiac rate disturbances, and quadriplegia caused by the trauma to his lower cervical spinal cord from the shock wave. Strully's interpretation reinforces my belief that the neck wound was undoubtedly a fatal injury that was largely overshadowed because the brain wound was so much more obviously fatal.

BULLET 399

Bullet 399, which wounded both men, is not "pristine"; it is, on the contrary, deformed. It has been bent on its long axis and has been compressed on its rear portion (Fig 4). It is a tough, fully jacketed bullet that requires a tremendous blow to deform it to this extent. This blow happened when the bullet was traveling sideways at approximately 1400 ft/s, after leaving President Kennedy's neck. It then struck Governor Connally going sideways and was compressed. This compression squeezed

the soft gray lead of the bullet core out the open rear end of the jacket, where it was scraped off during its passage (still tumbling) through Governor Connally's wrist. Three fragments of lead that matched the lead core of this bullet were recovered from Connally's wrist wound. A fourth fragment, in his thigh, was not recovered because it was of no importance. The people who have examined bullet 399 with their own fingers and persist in calling it "pristine" are deliberately misleading us. This bullet is deformed exactly as our test bullets were deformed after tumbling, going sideways, and striking our Connally simulations.^{5(p237)}

BACKWARD HEAD MOVEMENT

The first movement of President Kennedy's head was forward (away from the gun) for the first two frames after being struck in frame 313. The blast of heavy, wet brain substance, the evert-ing scalp, and three skull fragments all went forward. This forward motion of heavy, wet brain substance through the large exit wound on the front right side of the head acted like a jet engine and helped drive the head backward (toward the gun), after its initial forward movement. Because the point of exit was on

CASES OF INJURY TO THE CERVICAL REGION OF THE SPINAL CORD.

BY WILLIAM THORBURN, M.D., B.S. (LOND.), F.R.C.S.
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Fig 3.—Illustration from Thorburn's 1889 article, showing the peculiar position assumed by the elbows immediately after an injury to the spinal cord in the lower neck region. This is the same position into which Kennedy's elbows flew after bullet 399 passed through his neck, striking the tip of the transverse process of a vertebra in the lower portion of his neck and transmitting an impulse to his spinal cord to cause this reflex.

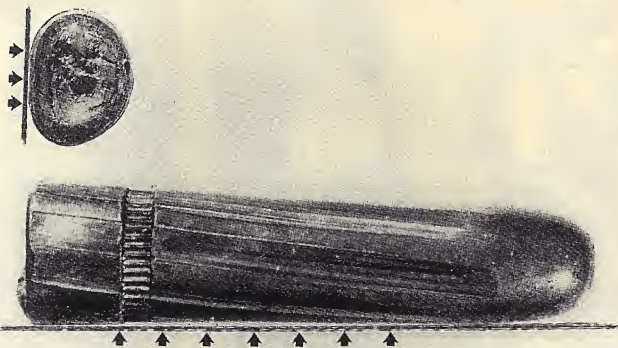


Fig 4.—After exiting President Kennedy's neck traveling sideways, bullet 399 was both flattened and bent when it hit Governor Connally. This bullet is decidedly not pristine; it is deformed.

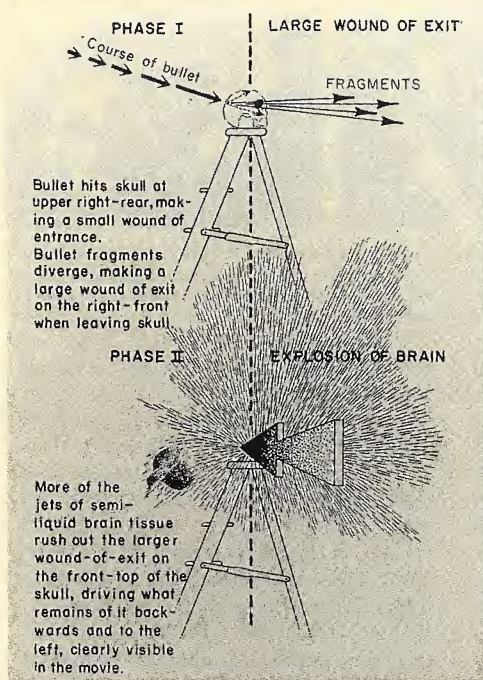


Fig 5.—Experimental model simulating bullet wound to Kennedy's head. (Figure from *Kennedy and Lincoln: Medical and Ballistic Comparisons of Their Assassinations*, Copyright © 1980 by John K. Lattimer, reproduced by permission of Harcourt Brace & Company.)

the right side of the head, the heavy brain substance also drove the head toward the left, so that the President fell down where Mrs Kennedy had been sitting. All of our experimental model heads fell toward the gun and to the left (Fig 5).^{5,8}

Other factors causing the head and torso to jerk backward were reflex contractions of the erector spinae muscles, some of the strongest muscles in the body. These tend to jerk the body upright and backward when all the muscles of the body are violently stimulated by the downward rush of impulses fol-

lowing a massive brain wound. Another factor was the contraction of the muscles of the back of the neck, as part of the "righting" mechanism that makes us jerk our heads upright if our heads are bent sharply forward. These muscles were already partly in contraction as a result of the bullet strike on the neck. The contrarian community of critics insists that the backward movement of the President's head indicates that he was shot from the front and the right. Careful examinations of the roentgenograms of the head showed no sign of a bullet exiting the head on the left

side. This would have been necessary if he had been shot from the front or the right.

These forward and backward movements of President Kennedy's head and torso occurred before the automobile suddenly accelerated forward. The fact that his torso was bound about the hips by his corset and a wide elastic bandage did not prevent the forward and then backward movements of his head and torso. The corset did, however, prevent him from crumpling down out of the line of fire, as did Governor Connally.

SHOTS FIRED

It is not difficult to accurately fire the rifle used by Lee Harvey Oswald every 5 seconds. This is the actual time interval between the observed strikes on President Kennedy in frame 224 and in frame 313. Not expert marksmen, my 14- and 16-year-old sons and I each easily put three bullets into models of Kennedy's head at the maximum distance involved (263 ft), firing once every 5 seconds (Fig 5).^{5(pp302-304),9}

The first bullet fired in Dealey Plaza, which missed the car completely, was fired at much closer range (175 ft) as the car was traveling under a tree practically under the Texas School Book Depository window. This bullet probably hit a tree branch and was deflected, striking the pavement outside the car completely. The approximate timing of the first shot can be determined by noting when several of the people in the Zapruder film turn to look back toward Oswald's window (at about frame 160). Connally heard the shot and twisted around to try to see President Kennedy. When he could not see the President over his right shoulder, he was preparing to look back over his left shoulder when he felt himself struck on the back as if by a fist. He saw he was covered with blood and realized that he had been shot through-and-through. President Kennedy, having seen Governor Connally make the exaggerated movement to try to look back at him, may have been leaning forward to ask Connally what he wanted when the bullet struck

him on the back of the neck. Because the back of Kennedy's neck was the site of a large fat pad from the steroids he was taking, the bullet strike would have passed more downward than in a normal person's neck. The fat pad, plus any leaning forward, would have accounted for the course of the bullet through the right side of the base of Kennedy's neck. It exited at his necktie knot, leaving a stain of blood on the necktie. The wound of exit in the front of Kennedy's neck was unexpectedly small because the skin was supported by the double layer of his overlapping collar band at this point. This prevented the skin from bulging ahead of the exiting bullet and bursting open widely, as it might otherwise have done. Anesthesiologist M. T. Jenkins, MD, recognized it as the exit wound corresponding to the entrance wound he felt on the back of the neck.^{5(p153)} The smallness of this neck exit wound led, at first, to some speculation that it might have been a wound of entry rather than the usually large wound of exit. The reason for its smallness clearly was the restraint of the collar band, as our repeated experiments demonstrated^{15(pp230-237)} and as textbooks on gunshot wounds refer to as buttressing or shoring of the wound edges.¹⁰

CONCLUSIONS

The data presented herein demonstrate that bullet 399 was deformed, not pristine; that bullet 399 went through both men at Zapruder frame 224; that both men started to react simultaneously at frame 225; that President

Kennedy's neck wound would have been fatal; that the backward recoil of President Kennedy's head resulted from a bullet from the rear; that the small size of the exit wound on the front of the neck was due to the buttressing of the skin by his shirt collar; and that there is no difficulty in accurately firing every 5 seconds with the 6.5-mm, Mannlicher-Carcano firearm.

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